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| New York City College of Technology | Mathematics Department Office: N711  |
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# MAT 2440 Discrete Structures & Algorithms I (3 cr, 4 hr) Spring 2018

## **Course Meetings:** D553: MW 2:00 – 3:40PM (N723) **Email:** ehalleck@citytech.cuny.edu

## **Instructor:** Ezra Halleck **Phone:** (718) 260-5931

## **Office Hours:** MW 2:30-3:30 and by appt **Office:** N726

**Text:** *Discrete Mathematics and its Applications, 7th ed,* Kenneth H. Rosen, McGraw-Hill

**Computer software:** Python and Maple: please save files to a flash drive

**Course Description:** This course introduces the foundations of discrete mathematics as they apply to computer science, focusing on providing a solid theoretical foundation for further work. Topics include functions, relations, sets, simple proof techniques, Boolean algebra, propositional logic, elementary number theory, writing, analyzing and testing algorithms.

**Prerequisite:** MAT1375 or higher, and CST 2403 or CST 1201 (i.e., a course on an object-oriented program)

**Student Learning Outcomes:** At the end of the semester, students will be able to

1. Use the rules of logic to understand mathematical statements and prove propositions using
	1. A direct proof.
	2. An indirect proof.
	3. A proof by contradiction.
2. Write simple algorithms using pseudocode and understand the efficiency of algorithms.
3. Understand basic number theory topics.
4. Identify and solve counting problems.
5. Use computer technology to assist in the above.

**Attendance:** Daily quizzes at the beginning of class should motivate you to arrive on time. If you leave early without getting approval PRIOR to the start of class, your quiz score will not count & you will be marked as absent. If at any point, I observe you doing activities (email, texting, games, movies, assignments from other classes) not relevant to the class, your quiz score will not count & you may be asked to leave the classroom.

**Cell phones:** Please turn *off* orplace on *vibrate* and out of sight.

**Academic honesty:** You are encouraged to work in groups on homework, but be able to explain *anything* you turn in. During an exam, showing someone else your work is cheating; you will be treated in the same way as the person who copies. It is your responsibility to cover your work.

**Set enough time aside each week:** You are expected to spend 4-6 hours outside the classroom each week reading the text, watching videos, working on projects, doing homework and preparing for exams.

***Time* problems?** Here is a **damage control priority list:**

1. *Read the section and/or watch the assigned videos prior to the class in which it is covered.* They will facilitate your understanding and participation in class and will frequently be part of the daily quiz.
2. *Attempt at least some of the homework problems immediately after class,* so that you know how much of the class you understood.
3. *Take advantage of office hours:* If you are unable to attend the scheduled hours, make an appointment.
4. *Make use of the Atrium & Voorhees Learning Centers (approximately 9AM-8PM, M-Th, shorter hours on F & Sat):* While some of the tutors are undergraduate students, many are adjunct faculty.
5. The math dept. often arranges for advanced math students to provide tutoring. Stay tuned for more info.

**Grade components**

**Daily quiz (10%):** based on the reading for that day, any material discussed in the previous class and especially homework from the previous section. This will also serve as attendance. Grade for each will be out of 10.

**Computer Programming Homework (10%):** You received separately a *list of problems*. Prior to class each day, you must post on blackboard python code (properly commented) or a jupyter notebook which treats and expands on ONE problem from the homework 2 classes ago. Grade based on a 4-point scale:

 **2 (perfunctory work), 3 (substantial), 4 (exceptional)**

**Project(s)** *Details TBA* **(10%):** You will be assigned a combination of openlab posts and comments or perhaps a computer programming project. Here is a list of possible projects from the course outline:

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| **Day(s)** | **Computing Project** |
| **13-15** | Implement the max and linear search algorithms in a programming language |
| **19** | Timing algorithms by input size. |
| **22-23** | Primality testing using a programming language. |
| **24** | Implement a hashing function and a pseudorandom generator in a programming language. |
| **25** | Implement a Caesar cipher. |
| **27** | Implement a Tower of Hanoi game. |

**Midterm Exams (45%):** There are 3 as noted in the schedule. If you miss an exam and have a valid (medical issue or family emergency), then you may take up to one (1) makeup exam done during my office hour. You have one week from your return date for the makeup and it will receive an automatic 10% points off from your score to encourage you to do all possible to take the exam on its appointed date.

**Final Exam (25%):** A sample exam will be posted on the openlab two weeks prior to the exam. If you miss the final exam and have been failing the course, you will receive a WU or F. Otherwise, if you have a documented illness or emergency, you will have opportunity to take a makeup final exam (small fee).



**Grade scale:**

93 – 100 A 77 – 79.9 C+

90 – 92.9 A- 70 – 76.9 C

87 – 89.9 B+ 60 – 69.9 D

83 – 86.9 B 0 – 59.9 F

80 – 82.9 B-